

NASA TECH BRIEF



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A New Method for Producing Optical Mirrors

The problem:

To design an improved optical mirror for use in telescopes and high resolution optical systems.

The solution:

Use pure silicon both as mirror and substrate in environments where large thermal changes occur and high optical quality is required.

How it's done:

The process consists of forming a mirror blank of silicon and grinding the surface to be used as the reflector to the desired shape. The surface is then optically polished and the reflective film deposited (if desired). The silicon substrate can be polished directly and coated with an aluminum film, as opposed to beryllium or aluminum substrates which require a chemically deposited nickel or oxide coating before they can be polished to optical component tolerances. The advantages of using silicon in place of other commonly used materials are as follows: 1) Its abundance; 2) Its strength, hardness, and greater predictability than glass; 3) Its chemical and physical stability; 4) Several methods exist to produce high purity silicon; 5) It can be inspected for flaws and

strain using optical techniques; and 6) It can be brought to a liquid state and molded.

Notes:

1. This innovation may be of interest to the optics industry and those personnel working in astronomy.
2. No further documentation is available. Inquiries may be directed to:

Technology Utilization Officer
Headquarters
National Aeronautics
and Space Administration
Washington, D.C. 20546
Reference: B69-10529

Patent status:

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457 (f)), to the Perkin-Elmer Corporation, Norwalk, Connecticut 06852.

Source: David A. Markle and Joseph Vrabel of
Perkin-Elmer Corporation
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Category 02